



1. A compound comprising a metal complexed with a chelating group  
5 attached to a gastrin releasing peptide (GRP) receptor agonist which includes a bombesin  
agonist binding moiety.

2. The compound according to claim 1, wherein said compound has a  
structure of the formula X-Y-B wherein X is a metal chelating group, Y is a spacer group or  
covalent bond and B is a gastrin releasing peptide receptor agonist which includes a  
10 bombesin agonist binding moiety.

3. The compound of claim 2 wherein Y is selected from the group  
consisting of at least one amino acid residue, a hydrocarbon chain and a combination thereof.

4. The compound of claim 2 wherein X is selected from the group  
consisting of DOTA, DTPA, S4, N3S, N2S2, NS3 and derivatives thereof.

15 5. The compound of claim 4 wherein Y is selected from the group  
consisting of at least one amino acid residue, a hydrocarbon chain and a combination thereof  
and B is selected from the group consisting of BBN(7-14) and BBN(8-14).

6. The compound of claim 4 wherein X is DOTA or a derivative thereof.

7. The compound of claim 6 wherein Y is selected is selected from the  
20 group consisting of at least one amino acid residue, a hydrocarbon chain and a combination  
thereof and B is selected from the group consisting of BBN(7-14) and BBN(8-14).

8. The compound of claim 7 wherein Y is a combination of L-glutamine  
and a hydrocarbon chain.

9. The compound of claim 8 wherein Y is a combination of L-glutamine  
25 and a C1 to C10 hydrocarbon chain.

10. The compound of claim 9 wherein Y is selected from the group  
consisting of glycine,  $\beta$ -alanine, gamma-aminobutanoic acid, 5-aminovaleric acid (5-Ava), 6-  
aminohexanoic acid, 7-aminoheptanoic acid, 8-aminooctanoic acid (8-Aoc), 9-aminononanoic  
acid, 10-aminodecanoic acid and 11-aminoundecanoic acid (11-Aun).

30 11. The compound of claim 4 wherein X is N3S or a derivative thereof.

12. The compound of claim 11 wherein Y is selected from the group  
consisting of at least one amino acid residue, a hydrocarbon chain and a combination thereof  
and B is selected from the group consisting of BBN(7-14) and BBN(8-14).

13. The compound of claim 12 wherein Y is gly-ser-gly.

35 14. A complex comprising a metal and a compound having a structure of  
the formula X-Y-B wherein X is a metal chelating group, Y is a spacer group or covalent bond

Table 1. Demographic characteristics of the study population	
Age (years)	65.8 (SD 7.2)
Gender	
Male	58 (44.6%)
Female	72 (55.4%)
Education (years)	12.5 (SD 2.1)
Marital status	
Married	65 (50.4%)
Single	13 (10.0%)
Widowed	42 (32.4%)
Divorced	10 (7.7%)
Employment status	
Employed	15 (11.5%)
Unemployed	113 (88.5%)
Income (USD/month)	1,200 (SD 300)
Health status	
Good	85 (65.4%)
Poor	45 (34.6%)
Comorbidities	
Hypertension	40 (30.8%)
Diabetes	25 (19.2%)
Cholesterol	30 (23.1%)
Arthritis	35 (27.0%)
Depression	15 (11.5%)
Stroke	10 (7.7%)
Heart disease	20 (15.4%)
Respiratory disease	15 (11.5%)
Other	10 (7.7%)
Medication use	
Yes	60 (46.2%)
No	70 (53.8%)
Medication type	
Antihypertensive	35 (27.0%)
Antidiabetic	20 (15.4%)
Anticholesterol	25 (19.2%)
Antiarthritic	30 (23.1%)
Antidepressant	10 (7.7%)
Antistroke	5 (3.8%)
Anticardiac	15 (11.5%)
Antipulmonary	10 (7.7%)
Other	5 (3.8%)
Healthcare utilization	
Regular visits	55 (42.3%)
Emergency visits	15 (11.5%)
Hospitalization	10 (7.7%)
Other	13 (10.0%)
Healthcare cost (USD/year)	1,500 (SD 500)
Health insurance	
Yes	75 (58.1%)
No	53 (40.9%)
Insurance type	
Private	30 (23.1%)
Public	45 (34.6%)
Medicaid	15 (11.5%)
Other	5 (3.8%)
Healthcare access	
Easy	60 (46.2%)
Difficult	70 (53.8%)
Healthcare quality	
Good	65 (50.4%)
Poor	65 (50.4%)
Healthcare satisfaction	
Satisfied	55 (42.3%)
Dissatisfied	75 (58.1%)
Healthcare utilization rate	0.65 (SD 0.15)
Healthcare cost ratio	1.2 (SD 0.3)
Health insurance rate	0.58 (SD 0.12)
Healthcare access rate	0.46 (SD 0.14)
Healthcare quality rate	0.50 (SD 0.10)
Healthcare satisfaction rate	0.42 (SD 0.18)
Healthcare utilization rate ratio	0.65 (SD 0.15)
Healthcare cost ratio ratio	1.2 (SD 0.3)
Health insurance rate ratio	0.58 (SD 0.12)
Healthcare access rate ratio	0.46 (SD 0.14)
Healthcare quality rate ratio	0.50 (SD 0.10)
Healthcare satisfaction rate ratio	0.42 (SD 0.18)

and B is a gastrin releasing peptide receptor agonist which includes a bombesin agonist binding moiety.

15. The complex of claim 14 wherein the metal is selected from the group consisting of transition metals, lanthanides, auger-electron emitting isotopes, and  $\alpha$ -,  $\beta$ - or  $\gamma$ -emitting isotopes.

16. The complex of claim 14 wherein the metal is selected from the group consisting of:  $^{105}\text{Rh}$ -,  $^{99\text{m}}\text{Tc}$ -,  $^{186/188}\text{Re}$ -,  $^{153}\text{Sm}$ -,  $^{166}\text{Ho}$ -,  $^{111}\text{In}$ -,  $^{90\text{Y}}$ -,  $^{177}\text{Lu}$ -,  $^{149}\text{Pm}$ -,  $^{166}\text{Dy}$ -,  $^{175}\text{Yb}$ -,  $^{199}\text{Au}$ - and  $^{117\text{m}}\text{Sn}$ -.

17. The complex of claim 16 wherein X is selected from the group consisting of DOTA, DTPA, S4, N3S, N2S2, NS3 and derivatives thereof.

18. The complex of claim 17 wherein Y is selected from the group consisting of at least one amino acid residue, a hydrocarbon chain and a combination thereof and B is selected from the group consisting of BBN(7-14) and BBN(8-14).

19. The complex of claim 16 wherein X is DOTA or a derivative thereof.

20. The complex of claim 19 wherein Y is selected from the group consisting of at least one amino acid residue, a hydrocarbon chain and a combination thereof and B is selected from the group consisting of BBN(7-14) and BBN(8-14).

21. The complex of claim 20 wherein Y is a combination of L-glutamine and a hydrocarbon chain.

22. The complex of claim 21 wherein Y is a combination of L-glutamine and a C1 to C10 hydrocarbon chain.

23. The complex of claim 22 wherein Y is selected from the group consisting of glycine,  $\beta$ -alanine, gamma-aminobutanoic acid, 5-aminovaleric acid (5-Ava), 6-aminoheptanoic acid, 7-aminoheptanoic acid, 8-aminooctanoic acid (8-Aoc), 9-aminononanoic acid, 10-aminodecanoic acid and 11-aminoundecanoic acid (11-Aun).

24. The complex of claim 23 wherein Y is 8-aminooctanoic acid.

25. The complex of claim 23 consisting of  $^{90\text{Y}}$ -DOTA-8-Aoc-BBN(7-14)NH<sub>2</sub>.

26. The complex of claim 23 consisting of  $^{111}\text{In}$ -DOTA-8-Aoc-BBN(7-14) NH<sub>2</sub>.

27. The complex of claim 23 consisting of  $^{177}\text{Lu}$ -DOTA-8-Aoc-BBN(7-14) NH<sub>2</sub>.

28. The complex of claim 23 consisting of  $^{149}\text{Pm}$ -DOTA-8-Aoc-BBN(7-14) NH<sub>2</sub>.

29. The complex of claim 23 consisting of  $^{90\text{Y}}$ -DOTA-5-Ava-BBN(7-14)NH<sub>2</sub>.

30. The complex of claim 23 consisting of  $^{111}\text{In}$ -DOTA-5-Ava-BBN(7-14) NH<sub>2</sub>.
31. The complex of claim 23 consisting of  $^{177}\text{Lu}$ -DOTA-5-Ava-BBN(7-14) NH<sub>2</sub>.
32. The complex of claim 23 consisting of  $^{149}\text{Pm}$ -DOTA-5-Ava-BBN(7-14) NH<sub>2</sub>.
33. The complex of claim 16 wherein X is N<sub>3</sub>S or a derivative thereof.
34. The complex of claim 33 wherein Y is selected from the group consisting of at least one amino acid residue, a hydrocarbon chain and a combination thereof and B is selected from the group consisting of BBN(7-14) and BBN(8-14).
35. The complex of claim 34 wherein Y is gly-ser-gly.
36. The complex of claim 34 consisting of  $^{99\text{m}}\text{Tc}$ -N<sub>3</sub>S-gly-ser-gly-BBN(7-14)NH<sub>2</sub>.
37. A method of treating patient using radioisotope therapy by administering an effective amount of a pharmaceutical comprising a metal complex with a chelating group with a gastrin releasing peptide receptor agonist which includes a bombesin agonist moiety.
38. The method according to claim 37, wherein said method includes administering an effective amount of a complex comprising a metal and a compound having a structure of the formula
- $$\text{X-Y-B}$$
- wherein X is a metal chelating group, Y is a spacer group or covalent bond and B is a gastrin releasing peptide receptor agonist which includes a bombesin agonist binding moiety.
39. The method of claim 38 wherein the metal is selected from the group consisting of transition metals, lanthanides, auger-electron emitting isotopes, and  $\alpha$ -,  $\beta$ - or  $\gamma$ -emitting isotopes.
40. The method of claim 38 wherein the metal is selected from the group consisting of:  $^{105}\text{Rh}$ -,  $^{99\text{m}}\text{Tc}$ -,  $^{186/188}\text{Re}$ -,  $^{153}\text{Sm}$ -,  $^{166}\text{Ho}$ -,  $^{111}\text{In}$ -,  $^{90}\text{Y}$ -,  $^{177}\text{Lu}$ -,  $^{149}\text{Pm}$ -,  $^{166}\text{Dy}$ -,  $^{175}\text{Yb}$ -,  $^{199}\text{Au}$ - and  $^{117\text{m}}\text{Sn}$ -.
41. The method of claim 40 wherein X is selected from the group consisting of DOTA, DTPA, S<sub>4</sub>, N<sub>3</sub>S, N<sub>2</sub>S<sub>2</sub>, NS<sub>3</sub> and derivatives thereof.
42. The method of claim 41 wherein X is DOTA or a derivative thereof.
43. The method of claim 42 wherein Y is selected from the group consisting of at least one amino acid residue, a hydrocarbon chain and a combination thereof and B is selected from the group consisting of BBN(7-14) and BBN(8-14).

44. The method of claim 43 wherein Y is a combination of L-glutamine and a hydrocarbon chain.

45. The method of claim 44 wherein Y is selected from the group consisting of glycine,  $\beta$ -alanine, gamma-aminobutanoic acid, 5-aminovaleric acid (5-Ava), 6-aminohexanoic acid, 7-aminoheptanoic acid, 8-aminooctanoic acid (8-Aoc), 9-aminononanoic acid, 10-aminodecanoic acid and 11-aminoundecanoic acid (11-Aun).

46. A method of imaging a patient by administering to a subject a diagnostically effective amount of a compound as set forth in claim 1.

47. The method of claim 46, wherein said method includes administering an effective amount of a complex comprising a metal and a compound having a structure of the formula



wherein X is a metal chelating group, Y is a spacer group or covalent bond and B is a gastrin releasing peptide receptor agonist which includes a bombesin agonist binding moiety.

48. The method of claim 47 wherein the metal is selected from the group consisting of transition metals, lanthanides, auger-electron emitting isotopes, and  $\alpha$ -,  $\beta$ - or  $\gamma$ -emitting isotopes.

49. The method of claim 48 wherein X is selected from the group consisting of DOTA, DTPA, S4, N3S, N2S2, NS3 and derivatives thereof.

50. The method of claim 49 wherein X is N3S or a derivative thereof.

51. The method of claim 50 wherein Y is selected from the group consisting of at least one amino acid residue, a hydrocarbon chain and a combination thereof and B is selected from the group consisting of BBN(7-14) and BBN(8-14).

52. The method of claim 51 wherein Y is gly-ser-gly.

53. A method of forming a therapeutic or diagnostic compound comprising the step of reacting a metal complexed with a chelating group with a gastrin releasing peptide receptor agonist which includes a bombesin agonist moiety.

54. The method of claim 53, wherein said method includes reacting a metal with a compound having a structure of the formula



wherein X is a metal chelating group, Y is a spacer group or covalent bond and B is a gastrin releasing peptide receptor agonist which includes a bombesin agonist binding moiety.

55. The method of claim 54 wherein the metal is selected from the group consisting of transition metals, lanthanides, auger-electron emitting isotopes, and  $\alpha$ -,  $\beta$ - or  $\gamma$ -emitting isotopes.

56. The method of claim 54 wherein the metal is selected from the group consisting of:  $^{99m}\text{Tc}$ - and  $^{186/188}\text{Re}$ -.

57. The method of claim 56 wherein Y is selected is selected from the group consisting of at least one amino acid residue, a hydrocarbon chain and a combination thereof.

58. The method of claim 57 wherein X is selected from the group consisting of DOTA, DTPA, S4, N3S, N2S2, NS3 and derivatives thereof.

59. The method of claim 58 wherein B is selected from the group consisting of BBN(7-14) and BBN(8-14).

60. The method of claim 59 wherein X is DOTA or a derivative thereof and Y is selected from the group consisting of glycine,  $\beta$ -alanine, gamma-aminobutanoic acid, 5-aminovaleric acid (5-Ava), 6-aminohexanoic acid, 7-aminoheptanoic acid, 8-aminooctanoic acid (8-Aoc), 9-aminononanoic acid, 10-aminodecanoic acid and 11-aminoundecanoic acid (11-Aun).

61. The method of claim 59 wherein X is N3S or a derivative thereof and Y is gly-ser-gly.